## AMENDMENTS TO THE SPECIFICATION:

**Please amend the specification paragraph beginning at page 11, line 3, as follows:**

**Exposure Cycle Time**: This term denotes the **[[a]]** desired duration of exposure to a given intensity, I, of radiation (e.g., UVC) divided by the percentage of efficiency of this intensity that is actually used for such exposure. For example, if the desired duration of exposure is 6 seconds at an intensity of $I_0$, and the actual exposure is 50%, then the exposure cycle time is a 12 second cycle time (= 6 seconds/50% exposure efficiency).

**Please amend the specification paragraph beginning at page 17, line 21, as follows:**

The discharge drum end 1311 outputs the sterilized food product 115 to a food product discharge subsystem 1121 adjacent thereto for receiving the food product 115 as it exits the drum 111. The discharge subsystem 1121 may include, e.g., a conveyor, a food bin, a food weighing station, or a screw type auger. Moreover, the discharge subsystem 1121 may include a food slide or chute 1123 operably attached to a frame 141 so that the food product 115 within the drum 111 exits the drum and contacts the discharge device without bruising the food product.**[[.]]** Optionally, the discharge subsystem 1121 may include an electromechanical gate that periodically opens to allow at least a portion of the food product 115 within the drum 111 to exit. In typical embodiments of the surface sterilizer 181, the retention time for sterilization of food product 115 in the drum 111 in the range of 2 seconds to 60 seconds depending on such parameters as the diameter and length of the drum 111, the configuration of the drum interior (e.g., the configuration of the tumblers 191), the inclination of the drum rotational axis 1341, the amount of food product in the drum 111, the desired food product exposure to the germicidal, the shape and texture of the food product being sterilized, the UVC irradiance generated by the UVC light assemblies 145.

**Please amend the specification paragraph beginning at page 21, line 4, as follows:**

Figs. 13A and 13B is a flowchart of the high level steps performed by the controller 1400 during food product sterilization.

**Please amend the specification paragraph beginning at page 34, line 25, as follows:**

Using such input from sensor(s) 1416 and 1420 (and/or any drum weighing sensors), the controller 1412 may, in one embodiment, predict whether the amount of food product 115 to be in the drum 111 at a future time will keep the drum loaded within a predetermined range, e.g., the range being set manually by an operator, or accessed from the food product settings database 1422 described further hereinbelow, and wherein the predetermined range may be indicative of a desirable in-drum food product weight, volume and/or depth of the food product. If the food product 115 amount is not within the predetermined range, then the controller 1412 may increase (or decrease) the food product flow rate to the drum and/or exiting the drum. Moreover, note that such a change may also require a change in the UVC irradiance of the emitters 161. Accordingly, prior to the controller 1412 requesting an increase in the food product in the drum 111 and/or a higher flow rate through the drum, the controller 1412 may request that the food product sterilization controller 1440 (described hereinbelow) determine whether an increase in UVC irradiance is necessary to continue to properly sterilize the food product 115 after such an in-drum food product increase and/or flow rate. If the food product flow controller 1412 receives notification from the food product sterilization controller 1440 that the desired surface sterilization rate can be maintained, the food product flow controller 1412 requests: (i) the food product sterilization controller to perform any necessary emitter 161 irradiance changes (perhaps starting at a future time), and (ii) instructs one or more food product flow devices to cause the food product within the drum 111 to increase and/or to cause the food product flow rate through the drum to increase.

**Please amend the specification paragraph beginning at page 36, lines 39 and 43 as follows:**

As an aside note that for at least some embodiments of the invention, the sterilization controller 1440 is programmed to assure a UVC irradiance of at least 1.5 to 2 times the minimum irradiance necessary to inactivate the targeted microorganisms on the food product 115. Thus, it is assumed that variations in food product sterilization factors

not fully modeled will ~~not~~ be compensated effectively by such additional UVC irradiance.

**Please amend the specification paragraph beginning at page 38, lines 14 and 19 as follows:**

The operator interface and command interpreter 1428 is the primary interface between the operator and the other modules of the controller 1400. In particular, the operator interface and command interpreter 1428 receives and interprets operator commands from operator command input device(s) 1472 directed to controlling various aspects of the food product 115 sterilization (e.g., changing the food product flow to the drum 111, changing the in-drum UVC irradiance, changing the drum inclination, changing the drum rotation rate, and/or terminating the sterilization process such as in an emergency stop). For example, upon receiving an operator command, the operator interface and command interpreter 1428 may interpret/parse the command, and then determine which submodule of the controller 1400 the resulting information should be directed. Thus, a**[[n]]** signal from the emergency stop button 1404 will cause a "stop" message to be sent to the safety controller 1436, whereas a request for information related to the food product 115 flowing into the drum 111 (e.g., the weight per minute flowing into the drum) may be directed to the report/log interface 1476. Note that, as stated hereinabove, substantially all operator commands for changing an aspect of the sterilization process will be first routed to the safety controller 1436 to obtain permission for the change, and subsequently, if such permission is granted, the command can then be forwarded to the submodule of the controller 1400 for performing the operator input command. However, if the safety controller 1436 determines that, e.g., a recent sensor input indicates a possible condition that would endanger personnel in proximity to the surface sterilizer 181, then the safety controller 1436 will not forward the command for processing, but will instead provide responsive communication to the operator (via the operator interface and command interpreter 1428) that the command can not be currently performed. Note that in addition to the emergency stop button 1404 (Fig. 1A), the operator interface and command interpreter 1428 may receive input from input devices 1472 such as an operator manipulateable computer pointing device (e.g., computer mouse), a touch screen, voice recognition software, and/or a keyboard. Additionally, the

operator interface and command interpreter 1428 may receive operator commands for notifying the report/log interface 1476 (described hereinbelow) to request the generation of a report/log from the sterilization log database 1480, e.g., related to the food product 115 sterilization performed by the surface sterilizer 181. Furthermore, the operator interface and command interpreter 1428 may output surface sterilizer and/or food product related information to the operator via the operator display 1432. Such outputs may be in response to an operator query and/or a notification generated by one of the submodules of the controller 1400 as one of ordinary skill in the art will understand. In particular, the operator interface and command interpreter 1428 may provide the operator (via the operator display 1432) with a menu of selections identifying different food products 115 for sterilization. Thus, the operator may provide input to the operator interface and command interpreter 1428 of the type of food product 115 to be sterilized and the operator interface and command interpreter then instructs the sterilization controller 1440 to retrieve the default (or last used) surface sterilizer 181 operating parameter values from the database 1422 and use the retrieved values for configuring the sterilizer 181 so that this food product can be sterilized. Additionally, the operator interface and command interpreter 1428 may allow the operator to query, add, delete and/or modify the sterilization settings (e.g., such as (6.1) – (6.7) above) in the food product settings database 1422 for a selected food product 115.

**Please amend the specification paragraph beginning at page 41, line 38 as follows:**

For a specific food product sterilization application, **[[at]]** some (and preferably most) of the following values are desirable to be known in order to appropriately configure an embodiment of the surface sterilizer 181 for the application: (a1) the food product 115 flow rate in, e.g., weight per unit of time (e.g., kilograms per minute), (a2) the food product 115 bulk density in weight per unit of volume (e.g., pounds per cubic foot), (a3) the range in size of the individual food product 115 items, (a4) a categorization of the food product surface texture (e.g., smooth to extremely convoluted), and (a5) the desired destruction rate for the most resistant targeted micro-organism(s) (e.g., bacteria, yeast, fungi, and/or mold spores). Such a configuration may additionally use measurements of: (b1) the drum 111 diameter (e.g., for determining an expected and/or

maximum food product 115 depth within the drum), (b2) the drum length (e.g., for determining the food product retention time within the drum and the UVC exposure time or dosage) , (b3) the tumbler 191 design (e.g., tumbler height and angle relative to the drum rotational axis), (b4) the drum inclination angle or range thereof (e.g., for determining food product retention time), (b5) the range in drum rotational speed, and (b6) the quantity, location, ambient operating temperature, and wattage of the UVC emitters 161 to provide the required dosage to all surfaces of the food product 115 to achieve the desired destruction rate of the most resistant anticipated micro-organisms. Note that using the above values and measurements settings may be initially established for surface sterilizing a particular food product at a range of food product flow rates. Thus, initial settings can be determined for the UVC irradiance (e.g., the number of emitters 161 to activate), the distance of the emitters from the in-drum food product 115 from the emitters, and the expected retention time within the drum 111 (while rotating within a particular range of rotational velocities and inclined at a particular angle).

**Please amend the specification paragraph beginning at page 42, line 17 as follows:**

Figs. 13A and 13B is a flowchart of the high level steps performed by the controller 1400 during food product sterilization, and in particular for determining whether a change to the food sterilization process can be safely performed. Prior to startup of the sterilizer 181, in step 1802, the safety controller 1436 identifies the components of the sterilizer that are required to be appropriately operable for safe operation of the sterilizer. Such identification may take place in two substeps: (1) identify the components that must be operable regardless of the food product being sterilized (e.g., the motor 173, various ones of sensors in Fig. 12, and the emergency button 1406), and (2) the components that must be sufficiently operable for the sterilizer 181 to operate safely, and to output a properly sterilized food product (e.g., a sufficient number of emitters 161 must be functional to obtain the desired UVC irradiance for the food product 115 that is to be sterilized). Since some embodiments of the surface sterilizer 181 may not include all of components shown in Fig. 12, the safety controller 1436 may access a sterilizer configuration data file from, e.g., the food product settings database 1422 for identifying the required components of the surface sterilizer 181 that

must be operable for the safety controller 1436 to determine that the sterilizer can be operated. Once such components have been identified, step 1804 is performed, wherein a determination is made as to whether the safety controller 1436 has determined that it is safe activate, reactivate and/or reconfigure all of the identified components of the surface sterilizer 181. Note that such components may be not currently active, or alternatively may be in an undesirable state and thus must be reconfigured. Subsequently, for each of the identified operable components, the safety controller 1436 may access a runtime data storage of descriptor (or "object" in object-oriented terminology) for determining:

(a) whether the component is currently active, available to be activated, or partially (or wholly) inoperable, and

(b) for each component that is identified as not currently active and is not identified as inoperable, the safety controller may query the component for its operational status, and/or the controller 1436 may test the component to determine its operational status and the operational status of any associated sensors.

**Please amend the specification paragraph beginning at page 43, line 17 as follows:**

Alternatively, if step 1804 determines that the sterilizer 181 is safe to operate, then in step 1816 the safety controller 1436 sends message(s) to one or more other components of the sterilizer 181 requesting activation and/or reconfiguration. Moreover, the safety controller 1436 may also provided output corresponding to the (any) operator indicating that the sterilizer 181 is safe to operate and/or has been reconfigured as requested, and additionally output corresponding data to the log database 1480. Subsequently, in step 1820 the safety controller 1436 waits for additional input. Note that substantially all sterilizer 181 (re)configuration commands input by the (any) operator, and (re)configuration requests by any sterilizer component (e.g., the food sterilization controller 1440, the food product flow controller 1412, the motor interface 1456) are routed back through the safety controller 1436.

**Please amend the specification paragraph beginning at page 44, line 40 as follows:**

If it is determined in step 1848 that a correction of a previously identified anomalous event has been performed, then in step 1852 the input is used to update the runtime sterilizer state data used by the safety controller 1436. Thus, e.g., the input may be indicative of a faulty emitter 161 being replaced with a new emitter. Accordingly, the sterilizer state data (also known as configuration data) is updated to reflect a new UVC irradiance capacity that can be generated by sterilizer 181. Alternatively, the input may be indicative of a person or object moving out of the range for activation of the above-mentioned warning sensor, and thus, e.g., any lights and/or alarms may be deactivated. The input may instead be indicative of a change in the flow of food product 115 into the drum 111 so that the flow is again within a preferred operational range. Accordingly, since the sterilizer 181 may have been reconfigured to process the unpreferred food product flow (e.g., the drum 111 rotation, UVC irradiance and/or drum inclination may have been changed, or, the sterilizer 181 may have been configured to become intermittently inactive until one of: (i) an predetermined amount of food product 115 resided in the drum 111, or (ii) a predetermined amount of time expired), the sterilizer state must updated to reflect the more desirable food product flow rate. Subsequently, step 1804 is again performed.